AMENDMENTS TO THE CLAIMS:

Please cancel claims 1-19, without prejudice. Please add new claims 20-46, as shown below.

This listing of claims will replace all prior versions and listings of claims in the Application:

Claims 1-19 (canceled)

Claim 20 (new): A plasma beam source, comprising in combination:

a discharge cavity having a first width;

a nozzle extending outwardly from said discharge cavity, said nozzle having a second width which is less than the first width;

at least one cathode electrode for supporting at least one magnetron discharge within said discharge cavity;

a plurality of magnets disposed adjacent said cavity for creating a magnetic field null region within said discharge cavity; and

an inlet, other than said nozzle, for introducing an ionizable gas into said discharge cavity.

Claim 21 (new): The plasma beam source of claim 20, wherein the ionizable gas inlet is located between said cathode electrode and said nozzle within said discharge cavity.

Claim 22 (new): The plasma beam source of claim 20, wherein the magnetic field includes three axial magnetic field regions, wherein two of the three axial magnetic field regions adjacent to the null region pass through said cathode electrode, and wherein the third axial magnetic field region comprises a mirror confinement region emanating through said nozzle.

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Claim 23 (new): The plasma beam source of claim 20, wherein the magnetic field null region is located along a center-line of said aperture.

Claim 24 (new): The plasma beam source of claim 20, wherein said cathode electrode is formed of a material which has a secondary electron emission coefficient greater than about 1.

Claim 25 (new): The plasma beam source of claim 20, further comprising a first power supply connected to said cathode.

Claim 26 (new): The plasma beam source of claim 25, wherein said nozzle is electrically interconnected with said first power supply to render said nozzle an anode.

Claim 27 (new): The plasma beam source of claim 20, wherein said nozzle is electrically floating.

Claim 28 (new): The plasma beam source of claim 20, wherein said nozzle is electrically connected to the ground.

Claim 29 (new): The plasma beam source of claim 26, further comprising a second power supply connected to said nozzle to render said nozzle an anode.

Claim 30 (new): A plasma processing apparatus, comprising:

a plasma beam source comprising a discharge cavity having a first width;

a nozzle extending outwardly from said discharge cavity wherein said nozzle has a second width which is less than the first width;

at least one electrode for supporting at least one magnetron discharge within said discharge cavity;

a plurality of magnets disposed adjacent to and external of said discharge cavity for creating a magnetic field null region within said discharge cavity;

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an inlet, other than said nozzle, communicating with said discharge cavity for introducing an ionizable gas into said discharge cavity; and

a process chamber, said beam plasma source being disposed within said process chamber.

Claim 31 (new): The plasma processing apparatus of claim 30, further comprising an anode disposed within said process chamber disposed physically apart from said plasma beam source.

Claim 32 (new): The plasma processing apparatus of claim 30, wherein said beam plasma source includes a cusp magnetic field producing at least one magnetron confinement zone within said discharge cavity.

Claim 33 (new): The plasma processing apparatus of claim 30, further comprising a power supply connected to said cathode.

Claim 34 (new): The plasma processing apparatus of claim 30, comprising two plasma beam sources creating a shared magnetic field between the two sources.

Claim 35 (new): A plasma processing apparatus, comprising;

an enclosure defining a cavity;

a power supply interconnected with said enclosure to render said enclosure a cathode electrode;

a cusp magnetic field defining a magnetic field null region disposed within the cavity; and

said cusp magnetic field comprising a first portion and a second portion, said first portion creating a closed drift electron magnetron confinement region within the cavity, and

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said second portion producing a mirror confinement region passing through and out of said cavity.

Claim 36 (new): A method for treating a substrate with a plasma beam, comprising the steps of:

providing a process chamber;

locating within the process chamber a plasma beam source comprising a discharge cavity having a first width, a nozzle extending outwardly from the discharge cavity the nozzle having a second width which is less than the first width; a plurality of magnets disposed adjacent to and external of the discharge cavity, said magnets creating at least one magnetron confinement region within said discharge cavity; and, a conduit, other than the nozzle, for introducing an ionizable gas into the discharge cavity;

placing the substrate within the process chamber and external to the plasma beam source;

introducing an ionizable gas into the discharge cavity through the conduit;

igniting a plasma within the magnetron confinement region;

projecting the plasma through the nozzle and onto the substrate.

Claim 37 (new): Apparatus for producing a plasma stream, said apparatus comprising in combination:

(1) a discharge cavity containing at least one magnetron cathode for generating electrons; and

(2) magnets disposed exterior of said discharge cavity generally facing one another for creating a cusp magnetic field within said discharge cavity and having a null region.

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Claim 38 (new): A method for producing a plasma stream, said method comprising the steps of:

(1) generating electrons in a discharge cavity containing at least one magnetron cathode; and

(2) creating a magnetic field within the discharge cavity having a null region with magnets external of the discharge cavity and facing one another.

Claim 39 (new): A source of plasma, said source comprising in combination:

(a) a discharge cavity containing at least one magnetron cathode for generating electrons, said discharge cavity having a first width;

(b) magnets disposed exterior of said discharge cavity for creating a magnetic field within said discharge cavity and having a null region;

(c) a nozzle for providing a conduit for electron flow from said discharge cavity, said nozzle having a second width less than the first width; and

(d) an inlet other than said nozzle for introducing an ionizable gas into said discharge cavity.

Claim 40 (new): The source of plasma as set forth in claim 39, wherein the ionizable gas inlet is located between said at least one cathode and said nozzle within said discharge cavity.

Claim 41 (new): The source of plasma as set forth in claim 39, wherein the magnetic field includes three axial magnetic field regions, wherein two of the three axial magnetic field regions adjacent to the null region pass through said cathode and wherein the third axial magnetic field region comprises a mirror confinement region emanating through said nozzle.

Claim 42 (new): The source of plasma as set forth in claim 39, including:

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(e) a power supply selected from the group consisting of AC power, DC power and RF power.

Claim 43 (new): The source of plasma as set forth in claim 42, including:

(f) an additional discharge cavity containing at least one magnetron cathode for generating electrons, said additional discharge cavity having a first width;

(g) additional magnets disposed exterior of said additional discharge cavity for creating a magnetic field within said additional discharge cavity and having an additional null region;

(h) an additional nozzle for providing a conduit for electron flow from said additional discharge cavity, said additional nozzle having a second width less than the first width; and

(i) an additional conduit other than said additional nozzle for introducing an additional ionizable gas into said additional discharge cavity.

Claim 44 (new): A method for creating a source of plasma, said method comprising the steps of:

(1) generating electrons in a discharge cavity containing at least one magnetron cathode, the discharge cavity having a first width;

(2) creating a magnetic field within the discharge cavity with magnets disposed external of the discharge cavity, which magnetic field includes a null region;

(3) providing a conduit for electron flow from the discharge cavity through a nozzle having a second width less than the first width; and

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(4) introducing an ionizable gas into the discharge cavity through an inlet other than said nozzle to produce a discharge of plasma containing electrons and the ionizable gas through the nozzle.

Claim 45 (new): The method as set forth ion claim 44, wherein the magnetic field includes three axial magnetic field regions wherein two of the three axial magnetic field regions adjacent to the null region pass through the cathode and wherein the third axial magnetic field region comprises a mirror confinement region emanating through the nozzle.

Claim 46 (new): The method as set forth in claim 44, including the steps of:

(5) generating electrons in an additional discharge cavity containing at least one additional magnetron cathode, the additional discharge cavity having a third width;

(6) creating an additional magnetic field within the additional discharge cavity with additional magnets disposed external of the additional discharge cavity, which additional magnetic field includes an additional null region;

(7) providing an additional conduit for electron flow from the additional discharge cavity through an additional nozzle having a fourth width less than the third width; and

(8) introducing an additional ionizable gas into the additional discharge cavity through an inlet other than said additional nozzle to produce an additional discharge of plasma containing electrons and the additional ionizable gas through the additional nozzle.

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